United Nations

Framework Convention on Climate Change

FCCC/ARR/2014/AUS

Distr.: General
12 January 2015

English only

Report on the individual review of the annual submission of Australia submitted in 2014*

* In the symbol for this document, 2014 refers to the year in which the inventory was submitted, and not to the year of publication.

GE.15-00361 (E)

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I. Introduction and summary

1. This report covers the review of the 2014 annual submission of Australia, coordinated by the UNFCCC secretariat, in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines). The review took place from 1 to 6 September 2014 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Ms. Ingrid Person Rocha e Pinho (Brazil) and Ms. Daniela Romano (Italy); energy – Ms. Ana Carolina Avzaradel (Brazil), Mr. Alexey Vladimirovich Cherednichenko (Kazakhstan) and Mr. Lawrence Kotoe (Ghana); industrial processes and solvent and other product use – Ms. Siriluk Chiarakorn (Thailand) and Ms. Natalya Parasyuk (Ukraine); agriculture – Mr. Jonas Bergström (Sweden) and Mr. Donald Reuben Kamdonyo (Malawi); land use, land-use change and forestry (LULUCF) – Ms. Shari Hayne (Canada), Mr. Doru Leonard Irimie (Romania) and Ms. Marina Vitullo (Italy); and waste – Ms. Medea Inashvili (Georgia), Ms. Sandra Jones (New Zealand) and Ms. Irina Yesserkepova (Kazakhstan). Ms. Inashvili and Ms. Romano were the lead reviewers. The review was coordinated by Ms. Lisa Hanle (UNFCCC secretariat).

2. In accordance with the Article 8 review guidelines, a draft version of this report was sent to the Government of Australia, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. All encouragements and recommendations in this report are for the next annual submission, unless otherwise specified. The expert review team (ERT) notes that the 2013 annual review report of Australia was published after 15 April 2014, which may have affected the Party's ability to implement recommendations and encouragements made in the previous review report.

3. All recommendations and encouragements included in this report are based on the ERT's assessment of the 2014 annual submission against the Article 8 review guidelines. The ERT has not taken into account the fact that Parties will prepare the submissions due by 15 April 2015 using the revised "Guidelines for the preparation of national communications by Parties include in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories" (hereinafter referred to as the UNFCCC Annex I inventory reporting guidelines) adopted through decision 24/CP.19. Therefore, when preparing the 2015 annual submissions, Parties should evaluate the implementation of the recommendations and encouragements in this report, in the context of those guidelines.

4. In 2012, the main greenhouse gas (GHG) emitted by Australia was carbon dioxide (CO_2), accounting for 73.2 per cent of total GHG emissions[1] expressed in CO_2 equivalent (CO_2 eq), followed by methane (CH_4) (20.5 per cent) and nitrous oxide (N_2O) (4.7 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.5 per cent of the overall GHG emissions in the country. The energy sector accounted for 76.0 per cent of total GHG emissions, followed by the agriculture sector (16.1 per cent), the industrial processes sector (5.7 per cent) and the waste sector (2.2 per cent). The solvent and product use sector was reported as included elsewhere ("IE"), not applicable ("NA") and not occurring ("NO"). Total GHG emissions amounted to 543,648.45 Gg CO_2 eq and increased by 31.0 per cent between the base year[2] and 2012.

[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified.

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year emissions include emissions from sources included in Annex A to the Kyoto Protocol only.

The ERT concluded that the description in the national inventory report (NIR) of the trends for the different gases and sectors is reasonable.

5. Tables 1 and 2 show GHG emissions from sources included in Annex A to the Kyoto Protocol (hereinafter referred to as Annex A sources), emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively.

6. Information to be included in the compilation and accounting database can be found in annex I to this report.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by gas, base year[a] to 2012

			Gg CO_2 eq								*Change (%)*
		Greenhouse gas	*Base year*	*1990*	*1995*	*2008*	*2009*	*2010*	*2011*	*2012*	*Base year–2012*
Annex A sources[b]		CO_2	276 137.55	276 137.55	302 576.43	399 084.15	398 668.77	399 364.82	398 161.39	397 830.60	44.1
		CH_4	115 184.34	115 184.34	111 247.25	113 592.76	110 806.53	109 062.64	110 274.74	111 709.50	–3.0
		N_2O	18 354.21	18 354.21	20 612.64	25 546.78	24 897.90	24 451.86	25 201.09	25 775.43	40.4
		HFCs	1 126.27	1 126.27	798.20	5 810.54	6 353.31	6 942.61	7 512.15	7 945.11	605.4
		PFCs	3 950.13	3 950.13	1 312.56	381.14	307.89	243.76	259.25	253.70	–93.6
		SF_6	221.70	221.20	316.89	158.40	143.23	145.19	134.14	134.11	–39.4
KP-LULUCF	Article 3.3[c]	CO_2				37 928.88	31 792.70	29 234.52	17 737.02	20 119.75	
		CH_4				1 388.32	1 187.57	1 072.37	889.47	698.01	
		N_2O				649.10	567.39	766.87	523.84	480.97	
	Article 3.4[d]	CO_2	NA			NA	NA	NA	NA	NA	NA
		CH_4	NA			NA	NA	NA	NA	NA	NA
		N_2O	NA			NA	NA	NA	NA	NA	NA

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable.

[a] The base year for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for all gases. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] CO_2, CH_4 and N_2O emissions included in the rows under Annex A sources do not include the emissions from deforestation that were included in Australia's initial report under the Kyoto Protocol for the base year and subsequently used for the calculation of the assigned amount.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

Table 2
Greenhouse gas emissions by sector and activity, base year[a] to 2012

			Gg CO_2 eq								Change (%)	
		Sector	Base year	1990	1995	2008	2009	2010	2011	2012	Base year	2012
Annex A sources		Energy	286 748.82	286 748.82	311 509.39	411 676.84	413 336.61	411 384.68	409 947.74	413 358.85		44.2
		Industrial processes	24 674.23	24 674.23	24 352.82	33 078.19	30 878.54	33 906.52	34 094.23	31 205.77		26.5
		Solvent and other product use	IE,NA,NO	IE,NA,NO	IE,NA,NO	IE,NA,NO	IE,NA,NO	IE,NA,NO	IE,NA,NO	IE,NA,NO		NA
		Agriculture	86 506.72	86 506.72	84 686.27	86 604.93	83 785.27	81 518.21	84 550.95	87 360.56		1.0
		Waste	17 043.92	17 043.92	16 315.48	13 213.81	13 177.22	13 401.46	12 949.84	11 723.27		-31.2
		LULUCF	NA	130 521.54	18 379.98	-7 044.58	16 782.28	28 590.76	-60 649.03	15 160.88		NA
		Total (with LULUCF)	**NA**	**545 495.24**	**455 243.95**	**537 529.18**	**557 959.92**	**568 801.64**	**480 893.73**	**558 809.33**		**NA**
		Total (without LULUCF)	**414 973.70**	**414 973.70**	**436 863.96**	**544 573.76**	**541 177.63**	**540 210.87**	**541 542.76**	**543 648.45**		**31.0**
		Other[b]	NA	NA	NA	NA	NA	NA	NA	NA		NA
KP-LULUCF	Article 3.3[c]	Afforestation and reforestation				-16 780.59	-15 236.42	-16 632.21	-19 374.69	-11 506.73		
		Deforestation				56 746.90	48 784.08	47 705.97	38 525.03	32 805.46		
		Total (3.3)				**39 966.30**	**33 547.66**	**31 073.76**	**19 150.34**	**21 298.73**		
	Article 3.4[d]	Forest management				NA	NA	NA	NA	NA		
		Cropland management	NA			NA	NA	NA	NA	NA		NA
		Grazing land management	NA			NA	NA	NA	NA	NA		NA
		Revegetation	NA			NA	NA	NA	NA	NA		NA
		Total (3.4)	**NA**			**NA**	**NA**	**NA**	**NA**	**NA**		**NA**

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, IE = included elsewhere, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable, NO = not occurring.

[a] The base year for Annex A sources is the base year under the Kyoto Protocol, which is 1990 for all gases. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

7. The 2014 annual submission was submitted on 15 April 2014; it contains a complete set of common reporting format (CRF) tables for the period 1990–2012 and an NIR. Australia also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 5 March 2014. The annual submission was submitted in accordance with decision 15/CMP.1.

8. The list of other materials used during the review is provided in annex II to this report.

2. Questions of implementation raised in the 2013 annual review report

9. The ERT noted that no questions of implementation have been raised in the 2013 annual review report.

3. Overall assessment of the inventory

10. Table 3 contains the ERT's overall assessment of the annual submission of Australia. For recommendations for improvements for specific categories, please see the paragraphs cross-referenced in the table.

Table 3
The expert review team's overall assessment of the annual submission

Issue	*Expert review team assessment*	*General findings and recommendations*
The ERT's findings on completeness		
Annex A sources[a]	Complete	Mandatory: None
		Non-mandatory: CO_2 emissions from post-mining activities (underground and surface mines); CO_2, CH_4 and N_2O emissions from multilateral operations; potential emissions of SF_6 emissions from electrical equipment; potential emissions of PFCs and SF_6 from imports (in bulk and in products); and CH_4 emissions from enteric fermentation (poultry)
		The ERT encourages the Party to estimate and report emissions from all non-mandatory categories
Land use, land-use change and forestry[a]	Complete	Mandatory: None
		Non-mandatory: Carbon stock change from wetlands remaining wetlands (all pools) and from settlements remaining settlements (all pools); CH_4 and N_2O emissions from drainage of forest soils; and CO_2, CH_4 and N_2O emissions from biomass burning on wetlands remaining wetlands

Issue	*Expert review team assessment*	*General findings and recommendations*
		The ERT encourages Australia to estimate and report emissions from all non-mandatory categories
KP-LULUCF	Complete	Australia does not report under deforestation those lands that converted naturally to forest land after 1990 from which the forest vegetation has been cleared (see para. 82 below)
The ERT's findings on recalculations and time-series consistency		
Transparency of recalculations	Sufficiently transparent	Please see paragraphs 18, 20 and 52 below for category-specific findings
Time-series consistency	Sufficiently consistent	Please see paragraphs 20 and 65 below for category-specific findings
The ERT's findings on QA/QC procedures	Sufficient	Australia has elaborated a QA/QC plan and has implemented tier 1 QA/QC procedures in accordance with that plan. However, the ERT identified issues which suggest that tier 1 QC procedures are not always appropriately implemented, especially in the LULUCF sector. In particular, the ERT identified inconsistencies between the NIR and CRF summary table 3 (e.g. N_2O emission from agricultural soils and CO_2 emissions from forest land), inconsistencies in AD between the CRF tables and the NIR (e.g. cropland remaining cropland and grassland remaining grassland), use of incorrect notation keys (e.g. Australia reports "NA" for HFC production after 1995, whereas the Party indicates that emissions from production did not occur after 1995, and reports "NO" for wetlands, settlements and other land converted to grasslands when the correct notation key should be "IE")
		The ERT recommends that the Party transparently describe the categories that have undergone additional tier 2 QC checks (e.g. verification of the IEF)
		Please see paragraphs 55, 63, 64, 77 and 80, below for category-specific recommendations
The ERT's findings on transparency	Not sufficiently transparent	For category-specific recommendations please see paragraphs 18, 21, 22, 25, 26, 27,28, 29, 31, 32, 38, 39, 45, 50, 54, 56 and 58 below

Abbreviations: AD = activity data, Annex A sources = source categories included in Annex A to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IE = included elsewhere, IEF = implied emission factor, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NIR = national inventory report, NO = not occurring, QA/QC = quality assurance/quality control.

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

4. Description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Inventory planning

11. The NIR described the national system for the preparation of the inventory. There were changes to the national system for the 2014 annual submission, as identified by the Party in its NIR. The designated representative with overall responsibility for the national inventory is the Department of the Environment (DE) (Assistant Secretary, National Inventory Systems and International Reporting Branch, Department of the Environment, Australian Government). DE incorporated the climate change sections of the Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education (DIICCSRTE), which was the former department responsible for inventory compilation. The functions have moved into DE as part of these updated administrative arrangements. DE is responsible for all aspects of activity data (AD) coordination, emissions estimation, quality control, improvement planning, preparation of the reports and the submission of reports to the UNFCCC on behalf of the Australian Government. Estimation of emissions is conducted by DE, utilizing the Australian Greenhouse Emissions Information System (AGEIS) and, for the LULUCF sector and KP-LULUCF activities, the Full Carbon Accounting Model (FullCAM), which are clearly presented in figures 1.1 and 1.2 of the NIR.

12. Data collection is centrally managed by DE. Input data for the energy, industrial processes and waste sectors are collected using the National Greenhouse and Energy Reporting Scheme (NGER). By legislative framework under NGER, companies whose energy production/use or GHG emissions meet certain thresholds must report facility-level data. The methods used by these companies are derived from the national inventory methods while the emission factors (EFs) have been derived using AGEIS. The Emissions and Energy Reporting System is used for the collection of the input data from companies. Other data sources are Australia's principal economic statistics agencies: the Australian Bureau of Statistics and the Bureau of Resources and Energy Economics (BREE). Consultants are employed to process satellite imagery, sourced by Geoscience Australia, to determine land cover for reporting the LULUCF sector. HFC data are sourced by compulsory reporting by gas importers. Finally, solid waste data from state and territory government agencies is supported by an exchange of letters between Australian and state government agencies.

13. Australia's quality assurance (QA) system operates at a number of levels: the preparation of the inventory is overseen within DE by the National Inventory and Projections Executive Committee; and a draft of the NIR is reviewed by the National Greenhouse Gas Inventory Committee, which includes representatives of the Australian state and territory governments, and the Commonwealth Scientific and Industrial Research Organisation (CSIRO). The review of inventory improvements is conducted by the National Inventory Users Group and the public review of the emission estimates and methods is coordinated by DE, through information made available via the departmental and AGEIS websites.

Inventory preparation

14. Table 4 contains the ERT's assessment of Australia's inventory preparation process.

Table 4
Assessment of inventory preparation by Australia

Issue	*Expert review team assessment*	*ERT findings and recommendations*
Key category analysis		
Was the key category analysis performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	Level and trend analysis performed, including and excluding LULUCF
Approach followed?	Tier 1	
Were additional key categories identified using a qualitative approach?	No	
Has the Party identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory?	Yes	
Does the Party use the key category analysis to prioritize inventory improvements?	Yes	
Assessment of uncertainty analysis		
Approach followed?	Tier 1	
Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	
Quantitative uncertainty (including LULUCF)	Level = ± 2.6% Trend = ±3.0%	
Quantitative uncertainty (excluding LULUCF)	Level = ± 2.2% Level = ±1.5%	

Abbreviations: IPCC good practice guidance = the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, LULUCF = land use, land-use change and forestry.

Inventory management

15. Australia has a centralized archiving system, AGEIS, which includes the archiving of disaggregated EFs and AD, and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory. The archived information also includes internal documentation on quality assurance/quality control (QA/QC)

procedures, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements. The archive is maintained and housed within DE. During the review, the ERT was provided with the requested additional archived information.

5. Follow-up to previous reviews

16. Recommendations from previous reviews that have not yet been implemented, as well as issues the ERT identified during the 2014 annual review, are discussed in the relevant sectoral chapters of the report and in table 9 below.

B. Energy

1. Sector overview

17. The energy sector is the main sector in the GHG inventory of Australia. In 2012, emissions from the energy sector amounted to 413,358.85 Gg CO_2 eq, or 76.0 per cent of total GHG emissions. Since 1990, emissions have increased by 44.2 per cent. The key drivers for the rise in emissions are the increase in emissions from: energy industries (by 78,556.36 Gg CO_2 eq, or 54.9 per cent), transport (by 29,940.77 Gg CO_2 eq, or 49.7 per cent), other sectors (by 5,318.92 Gg CO_2 eq, or 35.4 per cent) and manufacturing industries and construction (by 4,393.47 Gg CO_2 eq, or 12.4 per cent). The main factor leading to the increase in emissions in energy industries is a rise in electricity demand: as a result, emissions increased by 63,457.61 Gg CO_2 eq (49.0 per cent) between 1990 and 2012. Emissions from public electricity and heat production generally declined in more recent years, though emissions increased by 397.09 Gg CO_2 eq (0.2 per cent) between 2011 (192,611.05 Gg CO_2 eq) and 2012 (193,008.14 Gg CO_2 eq). Within the sector, 53.6 per cent of the emissions were from energy industries, followed by 21.8 per cent from transport, 9.7 per cent from manufacturing industries and construction and 6.5 per cent from fugitive emissions from solid fuels. Other sectors accounted for 4.9 per cent and fugitive emissions from oil and natural gas accounted for 3.1 per cent. The remaining 0.3 per cent were from other (energy).

18. The Party has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculations made by Australia between the 2013 and 2014 annual submissions were in the following category/subcategories: energy industries (public electricity and heat production, and manufacturing industries and construction (iron and steel and chemicals)). The recalculations were made in response to recommendations made in the 2013 annual review report and following changes in AD and EFs and updated information from BREE.[3,4] Compared with the 2013 annual submission, the recalculations decreased emissions in the energy sector by 12,091.79 Gg CO_2 eq (2.9 per cent) for 2011 and decreased total national emissions by 2.2 per cent. The recalculations could have been more comprehensively explained in the NIR. The ERT recommends that Australia include more detailed information about fuel reallocation and emission changes resulting from recalculations in the NIR to improve transparency.

[3] BREE 2013a. Australian Energy Statistics – Australian Energy Update 2013, Canberra.
[4] BREE 2013b. Beyond the NEM and the SWIS: 2011-12 regional and remote electricity in Australia. Canberra.

2. Reference and sectoral approaches

19. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data. Issues identified in table 5 are more fully elaborated in paragraphs 20–24 below.

Table 5
Review of reference and sectoral approaches

Issue	*Expert review team assessment*	*Paragraph cross-references*
Difference between the reference approach and the sectoral approach	Energy consumption: −59.14 PJ, −1.16% CO_2 emissions: −986.22 Gg CO_2, −0.27%	
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	Yes	See para. 20 below
Are differences with international statistics adequately explained?	Yes	See para. 21 below
Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	Yes	See paras. 22 and 23 below
Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	Yes	

Abbreviations: CRF = common reporting format, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

Comparison of the reference approach with the sectoral approach and international statistics

20. The ERT noted that for the entire time series, 1990–2012, the differences between the sectoral and reference approach vary within the range 0.4–2.3 per cent for CO_2 emissions from liquid and gaseous fuels and within the range 2.0–0.9 per cent for solid fuel. The largest driver for the difference between the two approaches in 2012 is the difference in CO_2 emissions from liquid fuel (2.3 per cent), explained by Australia in response to questions raised at earlier stages of the review as being due to the uncertainties within the reference approach. This arises from the sensitivity of the final apparent consumption and emission figures to the average density and energy content values used to convert production, exports, imports and stock change from volumetric units into energy units. In annex 4 of the NIR, Australia presents a very brief description of the estimate of CO_2 emissions from fuel combustion activities (covering both stationary combustion and transport). The ERT is of the view that, since the difference between the two approaches for liquid fuel is greater than 2 per cent, there should be sufficient information presented in CRF table 1.A(c) and in annex 4 to the NIR to explain the reasons for such differences. In response to questions raised by the ERT during the previous review, Australia had explained that the difference between the two approaches for the years prior to the latest year would be included and described in the relevant sections on uncertainty and time-series consistency in the 2014 annual submission. However, the ERT noted that the reference approach tables for the years prior to 2012 have not been revised to describe these differences. In response to the question raised by the ERT during the current review, the Party explained that due to the significant work required to update the reference approach

for all years back to 1990. Australia is implementing this recommendation in stages over the 2014 and subsequent annual submissions. In this 2014 annual submission the reference approach has been updated for the years 2008–2011. In forthcoming annual submissions the reference approach will continue to be recalculated for all years back to 1990. The ERT welcomes the Party's progress and reiterates the recommendation made in the previous review report that the Party prepare and revise the reference approach tables for the years prior to 2012 and present them in the NIR with explanations.

21. The ERT observed that, in 2012, coal production data reported in CRF table 1.B.1 are significantly higher (approximately 13–25 per cent for the time series) than those reported to the International Energy Agency (IEA). In response to a question raised by the ERT during the review, the Party indicated that the reason for this difference is that the coal production reported to the IEA only comprises black coal production and does not include brown (lignite) coal production. Australia provided an explanation, indicating that it has established a close consultation process with BREE, which is the organization which both produces Australia's energy statistics and provides Australia's submission to the IEA. Australia noted that it understands that BREE is also in consultation with the IEA to improve the consistency of data reporting, and anticipates an improvement in the reporting of Australia's coal production to the IEA in the future. The ERT welcomes this effort and recommends that the Party provide details of any relevant update on this collaboration in the NIR, as well as including a rationale for any differences observed between the CRF tables and the data reported to the IEA to improve transparency.

International bunker fuels

22. The ERT noted that for jet kerosene in international aviation, data are consistent within 2 per cent for all years except 2001 (data in the CRF tables are 4.5 per cent lower) and 2002 (data in the CRF tables are 3.7 per cent higher). Data for domestic aviation are systematically lower in the CRF tables by around 10 per cent for most years, with larger differences (up to 18.2 per cent) for 1990–1996. The two exceptions are 2004 and 2005 when the figures in the CRF tables are 18.2 and 31.7 per cent higher, respectively, than those reported to the IEA. In response issues raised during earlier stages of the review, Australia replied that the domestic and international splits for aviation fuel consumption are sourced from the Australian Energy Statistics, stating that further details explaining comparisons with the IEA data are provided in section 3.2.6 of the NIR. However, the ERT noted that the relevant information for jet kerosene in international aviation has not been provided in section 3.2.6 of NIR 2014. The ERT recommends that the Party continue to investigate the underlying issue and include a more detailed explanation in the text of its NIR.

23. Data in the CRF tables on residual fuel oil consumption in international marine bunkers averages 4.4 per cent lower than data reported to the IEA since 2003. This consistent disparity suggests a difference in calorific values.[5] However, larger discrepancies also occur (e.g. –20.0 per cent for the years 1992–1994) and in 2002 an opposite discrepancy (+10.9 per cent) is observed. Domestic navigation figures are systematically higher in the CRF tables than in the IEA data (by up to 100 per cent). According to the NIR, Australia systematically makes comparisons of its calculated implied emission factors (IEFs) with international data sources, but the ERT notes that the Party does not explain in the NIR why reporting data in the CRF tables vary from data reported to the IEA. Australia

[5] Australia reported energy data on a gross calorific value basis. This means that reported implied emission factors (IEFs) are about 5 per cent lower for liquid and solid fuels and biomass and about 10 per cent lower for gaseous fuels than would have been the case if the data were given on a net calorific value basis.

further noted in its NIR that the domestic and international splits for fuel consumption are sourced from the Australian Energy Statistics and that it has established a close consultation process with BREE, which, in turn, is in consultation with the IEA to improve the consistency of data reporting. As such, it is the ERT's view that Australia has started to implement the recommendation made in the previous review report to investigate the underlying issues leading to inconsistencies between the CRF tables and data reported to the IEA regarding residual fuel oil consumption in international marine bunkers. The ERT commends Australia for these activities and recommends that the Party reflect any progress made on this matter in the NIR.

Feedstocks and non-energy use of fuels

24. No problems were identified.

3. Key categories

Stationary combustion: liquid and solid fuels – CO_2, CH_4 and N_2O[6]

25. For petroleum refining, there was significant inter-annual change in the CO_2 IEF for liquid fuels between 2011 (68.26 t/TJ) and 2012 (64.62 t/TJ). The 2012 value is 5.3 per cent lower than the 2011 value. This is the largest inter-annual change exhibited in the time series; 2008/2009 (–2.1 per cent) and 2009/2010 (2.2 per cent) are the next largest inter-annual changes. In response to a question raised by the ERT during the review, Australia explained that estimates for CO_2 emissions from liquid fuels are based on facility-specific EFs obtained from NGER. The Party further noted that the IEF will tend to vary depending on the liquid fuel mix used and the refinery processes undertaken in the year. Australia had a limited number of refineries in 2012 (only seven). Therefore changes in fuel mix and qualities in those refineries will tend to result in minor variations in the overall liquid IEF. The ERT recommends that the Party include initial AD information from the seven national petroleum refining operations in the annual submission as an additional level of QA and to improve transparency.

26. In the NIR, for liquid fuel consumption in petroleum refining, Australia reported that emissions from refinery coke have also been noted in refining/storage (fugitive emissions from oil, natural gas and other sources). In response to a question raised by the ERT during the review for further clarification, Australia replied that the refinery coke emissions are reported under combustion of liquid fuels in petroleum refining and are not reported under fugitive emissions from oil, natural gas and other sources. The Party explained that the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) is not clear as to whether the emissions from this process are to be reported under fuel combustion or fugitive emissions. Australia therefore decided several years ago to maintain the reporting of these emissions under fuel combustion as most other Parties also use this approach. The ERT agrees with Australia's approach, but recommends that the Party more clearly present in the NIR details of where these emissions are reported.

27. Australia has implemented the recommendation made in previous review reports to reallocate black coal from iron and steel production (energy sector) to metal production (industrial processes sector) from 2003 onwards, when pulverized coal injection was first used in Australia (NIR p. 81). The reallocation of the fuel led to a fluctuation of the CO_2

[6] CH_4 and N_2O emissions from this category are not key. In addition, CO_2 emissions from other (stationary combustion) are not key. However, since all issues related to this category are discussed as a whole, the individual gases and categories are not assessed in separate sections.

IEF from 41.91 in 1990 to 63.5–60.7 t/TJ for the period 2002–2011, reported in the 2013 annual submission. In the 2014 annual submission, the CO_2 IEF declined from 48.77 t/TJ in 2009 to 42.99 t/TJ in 2010 and 39.94 t/TJ in the 2014 annual submission. In response to the question raised by the ERT during the review, Australia indicated that the reallocation of black coal does not represent all black coal used in iron and steel production. The Party indicated that there is also some minor use of black coal for combustion purposes, which has been retained in this category of the energy sector. This coal is driving the CO_2 IEF to be higher than that of coke oven gas alone, as well as the annual fluctuations observed in the IEF. The ERT welcomes the Party's explanation and recommends that the Party include this information in the NIR to improve transparency.

28. There are significant inter-annual changes in CO_2 emissions between 2010 (521.73 Gg) and 2011 (655.33 Gg) for combustion of liquid fuels in other stationary combustion. The 2011 value is 25.6 per cent higher than the 2010 value. In addition, the inter-annual variability between 2011 and 2012 (479.88 Gg CO_2 eq) is significant. The 2012 value is 26.8 per cent lower than the 2011 value. In response to questions raised during earlier stages of the review, Australia explained that the CO_2 emissions reflect the consumption of lubricants reported in the Australian Energy Statistics. The ERT recommends that Australia present this information in the NIR for transparency.

Road transportation: liquid fuels – CH_4

29. For gasoline, the CH_4 IEF from road transport varies throughout the time series, and in the reporting year 2012 is three times lower than in the base year 1990 (10.94 kg/TJ and 35.16 kg/TJ, respectively). In response to a question raised by the ERT during the review, Australia explained that, throughout the time series, progressively stricter emission standards have been introduced for new motor vehicles sold in Australia. Over time, the fleet composition reflects the improved performance of larger numbers of vehicles, operating with sophisticated catalysts and efficient fuelling systems. The steady rollout of these technologies into the fleet has been reflected in a steady decrease in the emissions of CH_4 and other unburned hydrocarbons from gasoline engines in particular. The ERT welcomes the Party's explanation and recommends that the Party include this information in the relevant chapter in its NIR to improve transparency.

Coal mining and handling: solid fuels – CO_2

30. According to the NIR (page 116), all CO_2 emissions from underground coal mines are reported based on direct measurement. The IEF for underground mining in 2012 was 13.08 kg CO_2/t coal. Statistical comparison with other countries was not possible as very few countries report CO_2 emissions from coal mining. The ERT is aware of research of in situ gas content for Russia, Ukraine and Kazakhstan resulting in an average CO_2 IEF of 2.09 kg CO_2/t coal.[7] The ERT welcomes the Party's initiative to measure and report these emissions and encourages the Party to undertake verification of the developed CO_2 IEF.

Oil and natural gas: liquid and gaseous fuels – CO_2 and CH_4[8]

31. Australia has reported in CRF table 1.B.2 large inter-annual changes in CH_4 emissions from natural gas production and processing (e.g. 182.1 per cent for 2008/2009, 24.2 per cent for 2009/2010, 38.4 per cent for 2010/2011and –37.5 per cent for 2011/2012). Overall, between 1990 and 2012 emissions increased by 129.3 per cent (1.51 Gg CH_4 and

[7] Russian Federation's NIR, available at <http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/8108.php>.

[8] CO_2 and CH_4 emissions from petroleum storage are not key. However, since all issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

3.46 Gg CH_4, respectively). In addition, there was a decline in CH_4 emissions from distribution of natural gas between 2011 (179.65 Gg CH_4) and 2012 (172.39 Gg CH_4) while CO_2 emissions from distribution increased (from 14.22 Gg in 2011 to 20.75 Gg in 2012); this represents a 46.0 per cent increase. During the review, the ERT requested that Australia provide a rationale for the observed trends. In response to the questions raised by the ERT during the review, Australia replied that the emission trends are the result of newly available information on the relative importance of CH_4 and CO_2 emissions from this category. The ERT notes that this response does not fully clarify the issue (for example, according to the NIR, the composition of pipeline natural gas does not change between the 2013 and 2014 annual submissions (see NIR table 3.42 of the 2014 annual submission)). The ERT recommends that Australia increase the transparency of its discussion on the reasons underlying the observed trends, along with supporting data, in the relevant chapter in its NIR to improve accuracy and transparency.

32. Australia is unable to separately report AD for flaring between oil and gas prior to 2009 and, therefore, flaring emissions were reported in the oil/gas combined category. With the available NGER data, beginning for the inventory year 2009, separate emissions data are available for the individual oil and gas flaring categories and therefore the flaring emissions have been reported for 2009 onwards in those respective categories. In NIR 2012, Australia specified that for the next inventory submission it will consider the feasibility of splitting the AD to create a time series that has consistent allocation between sectors. The ERT recommends that the Party identify appropriate methods to ensure a consistent time series for this category, and present this information in the NIR to improve accuracy and transparency.

33. The ERT noted that for fugitive emissions from petroleum storage the CO_2 and CH_4 IEFs slightly vary in the period 1990–2008 and decline thereafter: the CO_2 IEF declines from 284,240.06 kg/PJ in 2008 to 155,245.48 kg/PJ (a decline of 44.9 per cent) while the CH_4 IEF declines from 1,607.64 kg/PJ in 2008 to 1,047.31 kg/PJ in 2008 (a decline of 34.3 per cent). In response to a question raised by the ERT during the review, Australia clarified that, from 2009, it uses facility-specific NGER data on the amount of petroleum refined and the amount of petroleum stored, as reported by crude oil refinery facilities, and multiplies these by the corresponding IPCC default factors for CO_2 and CH_4. Prior to 2009, Australia did not have access to the AD from NGER and instead used a national-level estimate of all crude oil refined from BREE's Australian Energy Statistics data (which is also multiplied by the same IPCC default factor for CO_2 and CH_4). The ERT accepts Australia's response but notes that the Party has reported AD for the period since 2009 that is not truly reflective of the actual AD that was applied to estimate emissions. Australia intends to correct this in the next annual submission. The ERT commends the Party for its efforts in responding to the request and investigating the issue, and recommends that Australia update the AD in the CRF tables, as planned.

4. Non-key categories

Civil aviation: liquid – CH_4

34. The previous review report identified that Australia used constant landing and take-off (LTO) data between 2010 and 2011 due to lack of data on LTO, thereby skewing CH_4 emissions to negative growth. In response to questions raised by the ERT during the preview review, the Party indicated that data were available, but that they had not been available at the time of the 2013 annual submission to address this issue. In the 2014 annual submission, based on newly available BREE data, the Party made a recalculation and resolved the issue by having a consistent time series of AD. The ERT commends Australia for this effort and cooperation with BREE.

C. Industrial processes and solvent and other product use

1. Sector overview

35. In 2012, emissions from the industrial processes sector amounted to 31,205.77 Gg CO_2 eq, or 5.7 per cent of total GHG emissions, and emissions from the solvent and other product use sector were reported as "IE", "NA", "NO". Since 1990, emissions have increased by 26.5 per cent in the industrial processes sector. The key driver for the rise in emissions in the industrial processes sector is a 175.3 per cent growth in emissions associated with the manufacture of chemical products. Within the industrial processes sector, 34.2 per cent of the emissions were from metal production, followed by 25.9 per cent from consumption of halocarbons and SF_6, 21.1 per cent from mineral products and 18.1 per cent from chemical industry. Other production accounted for 0.7 per cent. Emissions from production of halocarbons and SF_6 were reported as "NA", "NO" and emissions from other (industrial processes) were reported as "NA".

36. Australia has made recalculations between the 2013 and 2014 annual submissions for the industrial processes sector. The most significant recalculation made by Australia between the 2013 and 2014 annual submissions was in the following category: metal production. The recalculations were made in response to the 2013 annual review report. Compared with the 2013 annual submission, the recalculations increased emissions in the industrial processes sector by 768.94 Gg CO_2 eq (2.3 per cent), and increased total national emissions by 0.1 per cent. The recalculations were adequately explained in the NIR.

2. Key categories

Iron and steel production – CO_2

37. Australia reported CO_2 emissions from iron and steel production by using the tier 1b method. The previous review report recommended that Australia reallocate process-related emissions from the energy sector to the industrial processes sector. In the 2014 annual submission, Australia has reported CO_2 emissions from the use of coke, pulverized coal and natural gas as reducing agents in iron and steel production under the industrial processes sector. The AD, EFs and the methodology are clearly explained in the NIR. The ERT commends Australia for this effort and cooperation.

Consumption of halocarbons and SF_6 – HFCs

38. The ERT welcomes the improvement made by Australia in its 2014 annual submission, in response to recommendations made in previous review reports to report emissions for the previous unspecified mix of HFCs separately for the first time. Australia reported actual HFC-134, HFC-227ea, HFC-23, HFC-236fa and HFC-43-10mee emissions from refrigeration and air-conditioning equipment for the years 1994–2011. In the previous annual submission these were reported as "NO". For 2012, emissions of these gases were 1.22t, 36.88 t, 0.38 t, 0.004 t, 0.89 t, respectively. Also, Australia reported separately emissions from foam blowing, fire extinguishers, aerosols and solvents. In the previous annual submission these were reported as "NA", "NO". In order to implement these improvements, Australia obtained bulk import data at a more disaggregated level which confirmed that these gases were being imported into Australia. However, the NIR does not contain a clear description of AD sources, EFs and methodology. The ERT reiterates the recommendation made in previous reports that the Party continue to increase the transparency for this category by providing a clear description of AD, EFs and the methodology used for estimating emissions.

3. Non-key categories

Electrical equipment – SF_6

39. Australia continues to report SF_6 emissions resulting from the disposal of electrical equipment together with the operational emissions (4.83 t SF_6 in 2012). This is not fully consistent with the IPCC good practice guidance, as these SF_6 emissions should be reported separately in order to assess whether the appropriate AD and EFs are applied. In the NIR, Australia explained that it reported EFs obtained from facilities under NGER, which reflect emissions from the operation of equipment and also emissions from disposal and are supported by a national study.[9] A separate estimate of emissions from disposal is not available. Although the ERT is comfortable that the approach, AD and EF are sufficiently robust and that total emissions are accurately reported, the ERT nevertheless reiterates the recommendation made in the previous review reports that Australia improve the transparency of its reporting by disaggregating the emissions and reporting the estimates separately under each function (operation and disposal).

D. Agriculture

1. Sector overview

40. In 2012, emissions from the agriculture sector amounted to 87,360.56 Gg CO_2 eq, or 16.1 per cent of total GHG emissions. Since 1990, there has been no significant driving trend, as emissions have increased by only 1.0 per cent. Within the sector, 64.3 per cent of the emissions were from enteric fermentation, followed by 17.5 per cent from agricultural soils, 13.4 per cent from prescribed burning of savannas and 3.7 per cent from manure management. Rice cultivation and field burning of agricultural residues each accounted for 0.5 per cent. Emissions from other (agriculture) were reported as "NO".

41. Australia has not made any major recalculations between the 2013 and 2014 annual submissions for this sector.

42. Since the 2010 annual review report, recommendations have been made to Australia to establish a pre-weaning class for dairy cattle in the Australian inventory. In response to a question raised by the ERT during the current review as to the status of implementation of this recommendation, Australia explained that it plans to implement the pre-weaning class for dairy cattle in its 2015 annual submission. The reason for the delay has been resource constraints; and given that the method change has a minor impact on overall emissions it was not rated as a high priority for implementation. During the review, Australia provided preliminary calculations to the ERT indicating that the implementation of a pre-weaning class will result in a small decrease in the total agriculture sector emissions of approximately 0.05 per cent (47.3 Gg CO_2 eq). The ERT reiterates the recommendation made in previous review reports that the Party include a pre-weaning class for cattle.

2. Key categories

Enteric fermentation – CH_4

43. The CH_4 IEF for enteric fermentation emissions from sheep (6.73 kg/head/yr in 2012) in Australia is lower than the IPCC default value (8.00 kg/head/yr) and among the lowest of the reporting Parties (range 4.15–19.85 kg/head/yr for 2012). In the NIR, Australia describes food restrictions as one contributing factor. Considering the large

[9] Energy Networks Association. (2008) *ENA Industry Guidelines for SF_6 Management*. ENA Doc 022-2008.

number of sheep in Australia this makes the estimation of feed availability (i.e. NIR table 6.D.3) of central importance for the emission estimate. In response to a question raised by the ERT during the review regarding how the feed availability data were developed, the Party responded that the values are derived through an expert elicitation process. The Party also provided a description of how the elicitation process was performed (i.e. the underlying data sources, the reasoning applied when specific values were chosen and the qualifications of the experts). The ERT concludes that the expert elicitation process is in line with the reporting requirements and that it provides relevant information on the methodologies and EFs used for the estimation of emissions. The ERT welcomes the efforts the Party has undertaken to develop country-specific factors.

Manure management – CH_4 and N_2O

44. The previous review report noted that Australia's inventory improvement plan included an effort to upgrade the country-specific model (PigBal) to update feed intake, herd characteristics and waste management system allocation. The recommendation in the previous review report was that Australia make every effort to include the results of the upgraded country-specific PigBal model in the estimation of emissions for its next annual submission and include a description of the methodological approaches, parameters and EFs used in the NIR. In the NIR of the 2014 annual submission (page 292), Australia writes that "The PigBal model used for the emissions estimates is currently being upgraded by the Queensland Department of Agriculture, Fisheries and Forestry to improve the accuracy of manure production. Once the upgraded model is available (expected in early 2014) a review of the pig method will be conducted". Noting that the Party has not incorporated the results from the model upgrade in the 2014 annual submission, but that data should now be available, the ERT recommends that Australia implement the upgraded PigBal model into the Australian inventory as soon as it has undergone appropriate QA/QC controls.

Direct soil emissions – N_2O

45. During the previous review, the ERT noted that Australia had not transparently described the application of synthetic fertilizers to forests by disaggregating the quantity of fertilizer nitrogen (N) applied to forests from total fertilizer sales. In response to a question raised by the ERT during the current review, the Party explained that it does not have sufficient data to specifically allocate fertilizer use to forest land and that it is assumed that the fertilizer applied to forest lands is included under the fertilizer applied to non-irrigated grassland systems. The ERT reiterates the recommendation made in the previous review report that Australia include a full explanation in its NIR, and encourages the Party to continue to explore opportunities to collect these data.

46. In response to a recommendation made in the previous review report, Australia provided in the NIR references to the sources of country-specific data on residue-to-crop ratios, dry matter content and carbon to nitrogen (C:N) ratios and additional information. The ERT commends the Party for increasing the transparency of its reporting by including this information.

Prescribed burning of savannas – CH_4 and N_2O

47. In its 2012 annual submission, Australia included a revised country-specific methodology for estimating N_2O emissions from prescribed burning of savannas and planned to implement an independent QA process by comparing its data with the AGEIS estimates to ensure that the burning method had been implemented correctly. The ERT notes and commends Australia for including in the 2014 annual submission the results of its QA efforts to validate the method.

48. In the 2013 annual review report the ERT noted that Australia continues to report "0.00" for many cells under additional information in CRF tables 4.A and 4.E instead of the

appropriate notation keys. The current ERT concludes that this issue has been partly resolved. In CRF table 4.A, Australia now uses the phrase "pasture" for camels and llamas and horses where 0.00 was previously used. However, this is not solved in CRF table 4.E where zeroes are still reported under additional information. The ERT reiterates the recommendation made in the previous review report that Australia use the appropriate values or notation keys.

3. Non-key categories

Rice cultivation – CH_4

49. Australia reports that, for the rate of CH_4 emissions from rice fields, it uses a seasonally weighted average of 1.50 kg CH_4/ha/day based on research by Sass (1994)[10] and Sass and Fisher (1994)[11] from the United States of America, which presents values ranging from 0.50 to 5.50 kg CH_4/ha/day. The ERT does not consider "1.50" to be an average from the range of "0.50" to "5.50". In response to a question raised by the ERT during the review, Australia said that in developing the EF it only included in the analysis those treatments which were consistent with the management practices applied in Australia; hence the resulting country-specific average EF of 1.50 kg/ha/day was not consistent with the average of the range reported by Sass and Fisher. Australia also said that it is planning to implement the method set out in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) for the next annual submission. The ERT welcomes this planned development and looks forward to inclusion of the new methodologies in the 2015 annual submission.

50. In reporting on uncertainties and time series consistency for rice cultivation (section 6.4.3 of the NIR), Australia states that "[t]ime series consistency is ensured by the use of consistent methods". The ERT does not consider this statement to be transparent. In response to a question raised by the ERT during the review, the Party explained that this means that "the time series were ensured by using the same method and data sources in all years". The ERT welcomes this explanation and recommends that the Party include this explanation in the NIR to improve the transparency of its reporting.

E. Land use, land-use change and forestry

1. Sector overview

51. In 2012, net emissions from the LULUCF sector amounted to 15,160.88 Gg CO_2 eq. Since 1990, net emissions have decreased by 88.4 per cent. The key drivers for the fall in emissions are the steady decline of conversion of forest land to cropland and grassland, as well as the increase of conversions from grassland to forest land. The large inter-annual variation of LULUCF emissions is mainly attributable to natural disturbances such as wildfires. Within the sector, 30,413.64 Gg CO_2 eq of net removals were from forest land, followed by 2,288.36 Gg CO_2 eq from other (LULUCF). Net emissions were reported from grassland (32,594.28 Gg CO_2 eq) and cropland (15,268.61 Gg CO_2 eq). Emissions from wetlands were reported as "IE", "NA", "NE" (not estimated) and "NO"; emissions from

[10] Sass RL. 1994. Short Summary Chapter for Methane. *In*: K Minami, A Mosier and R Sass (eds.). *CH_4 and N_2O: Global Emissions and Controls from Rice Fields and Other Agricultural and Industrial Sources*. [NIAES Series 2.?]Tsukuba, Japan: NIAES. pp. 1–7.

[11] Sass RL and Fisher FM. 1994. CH_4 Emission from Paddy Fields in the United States Gulf Coast Area. *In*: K Minami, A Mosier and R Sass (eds.). *CH_4 and N_2O – Global Emissions and Controls from Rice Fields and Other Agricultural and Industrial Sources*. NIAES Series 2. Tsukuba, Japan: NIAES. pp. 65–77.

settlements were reported as "IE", "NE", "NO" and emissions from other land were reported as "NO".

52. Australia has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculation made by Australia between the 2013 and 2014 annual submissions was in the following category: forest land remaining forest land. Compared with the 2013 annual submission, the largest recalculation related to the emission estimates for grassland (emissions decreased by 11,888.17 Gg CO_2 eq or 24.9 per cent) and cropland (emissions decreased by 9,096.53 Gg CO_2 eq or 58.9 per cent). The recalculations were not adequately explained in the NIR or the CRF tables. However, in response to questions raised by the ERT during the review, Australia explained that the recalculations are mainly attributable to the change in the estimation model, which no longer includes the shedding and resprouting of leaves as a source of emissions. The high level of variability in the emission estimates associated with this process was because the input data was a climatic variable (vapour-pressure deficit), which was masking long-term emission trends in the forest land remaining forest land category. The ERT recommends that Australia include in the NIR information regarding the estimation model, specifically regarding the change concerning shedding and resprouting and also recommends that the Party further monitor the performance of the revised model and provide updates in the NIR. Finally, the ERT recommends that the Party provide detailed explanations on any future recalculations in the NIR.

53. As highlighted in the previous review report,[12] the land representation of Australia is complex, in particular because of the transition period of up to 50 years (differentiated by land categories/subcategories) corroborated with relevant data availability from 1972 onwards, and the different sources and assumptions used to represent land-use changes. During the review, the ERT asked Australia for further information regarding the methodology used by the Party to combine and harmonize different data sources to represent land uses and land-use changes, and the timeframe used for moving land-use categories into the 'converted' categories, correlated with soil carbon transitions. In response to the question raised by the ERT during the review, the Party confirmed that it is currently assessing data to estimate land clearing prior to 1972 in order to implement this in the national GHG inventories over the next few years, and provided additional information to the ERT regarding this work. The ERT recommends that the Party include this more detailed information regarding the combination and harmonization of different data sources/databases to represent land-use categories and conversions, as well as the time frames used for these conversions and the associated changes to soil carbon stocks in the annual submission.

54. Following up on the status of implementation of a recommendation made in the previous review report,[13] the ERT requested that the Party provide a summary table, for each land category and subdivision, with additional relevant information related to land representation, including the methodology applied for preparing land data, background data and transition periods applied). In response to the question raised by the ERT during the review, the Party provided additional information on land representation, including specific references to different sections in chapter 7 of its NIR. The ERT recommends that the Party include, in the LULUCF chapter, synthesized information related to land representation, including the methodology applied for the assessment of land use and land-use change, background data and transition periods applied, in line with the information provided during this review. The ERT raised a question regarding the status of implementation of the related recommendation from the previous review report that the Party provide a confusion

[12] FCCC/ARR/2013/AUS, paragraphs 82 and 83.
[13] FCCC/ARR/2013/AUS, paragraph 84.

matrix[14] for both land converted to grassland and land converted to cropland to ensure that no systematic errors affect the estimates. In response to the question raised by the ERT during the review, the Party replied that the results of this ongoing work will be included in the 2015 annual submission. The ERT reiterates the recommendation made in the previous review report that the Party include, in the NIR, a confusion matrix for both land converted to grassland and land converted to cropland.

55. Based on the analysis of data presented in the NIR and the CRF tables, and the additional information provided by the Party during the review, the ERT considers that there remain some discrepancies between data included in the NIR (table 7.6) and the CRF tables for several years in the time series, specifically regarding AD for the subcategories cropland remaining cropland and grassland remaining grassland (e.g. for 1999 cropland is reported as 25.47 Mha in the NIR and 25.48 Mha in the CRF tables, and grassland is reported as 443.14 Mha in the NIR and 443.16 Mha in the CRF tables). The ERT recommends that the Party enhance QA/QC measures and ensure full correspondence between data reported in the NIR and the CRF tables regarding distribution on total land area per land-use categories/subcategories.

2. Key categories

Forest land remaining forest land – CO_2

56. The previous review report noted that Australia reports "NO" for carbon stock losses from living biomass in harvested native forests, even though the methodology reported for estimating carbon stock changes in the harvested native forests includes losses associated with harvesting. Recommendations made in the previous review report included that Australia address this inconsistency either by reporting separately carbon stock gains and losses of living biomass or by using the notation key "IE" for carbon stock losses. Following up on this recommendation, the current ERT asked the Party to provide clarification regarding the database used to derive wood harvesting in the gain–loss method for estimating losses in forest land remaining forest land. In response to the question raised by the ERT during the review, the Party provided information regarding data availability, disaggregated at the regional level. Following a subsequent question regarding the methodology used by the FullCAM model to estimate CO_2 emissions from wood harvesting, the Party presented the methodological steps, with specific references to information already included in the NIR. The ERT recommends that the Party present in the NIR more comprehensive information regarding wood harvesting, in line with the explanations provided during the review.

57. The ERT noted that no information is available to date on plantations prior to 1990 and Australia reported in the NIR that "[m]apping of plantations established prior to 1990 using Landsat MSS data is ongoing". In response to the question raised by the ERT during the review, the Party provided further information regarding the plantations established before 1990 considered under the forest land remaining forest land category, and the transition times used. The Party also confirmed that the initial/reference soil carbon value of 38.71 t C/ha used in the estimation of carbon stock change in soil represents an average corresponding to different types of plantations and management practices. The ERT recommends that the Party include in the NIR additional information regarding the mapping of plantations established/recorded from 1940–1989, and the associated estimates.

58. According to the NIR (page 25), "fuelwood is extracted from dead organic matter across all forest categories and not against any individual category or categories." In

[14] A confusion matrix is a matrix where each column of the matrix represents the instances in a predicted class, while each row represents the instances in an actual class.

response to a question raised by the ERT during the review, regarding information demonstrating that there is no double counting of emissions from dead organic matter presumed to remain on site from natural processes or harvesting and emissions originating from fuelwood extracted from dead organic matter, the Party acknowledged that although this double counting is still possible due to the assumptions made in the estimations, it remains highly unlikely. The ERT recommends that, in order to increase transparency, the Party present in the NIR the methodology used to estimate emissions from fuelwood extractions from dead organic matter pools.

59. The Party stated in the NIR (para. 7.5.5.1) that "Data on forest extent (area), age class and growth that are used in the harvested native forests model were derived from Australia's National Forest Inventory (NFI)". In response to a question raised by the ERT during the review regarding further information about the national forestry inventory (NFI), the Party responded that the NFI is collaborative partnership between Australia's eight state and territory governments with the federal government, with the mission "to be the authoritative source of information for national and regional monitoring and reporting to support decision making on all of Australia's forests". Australia further indicated that the NFI does not imply that a regular measurement programme is in place to measure carbon stocks in Australia's forests. Such programmes are considered uneconomic in Australia. Since the notion of "NFI" can have different meanings among the reporting Parties, the ERT recommends that Australia provide in the NIR additional information regarding the mandate of its NFI, detailing the alternative means used to obtain and derive data on emissions and removals from the biomass and non-biomass pools in the forest land remaining forest land subcategory.

60. The ERT noted that Australia reported "NE" for non-CO_2 emissions from drainage of soils on forest land and used the notation key "IE" in table 11.2 in the NIR regarding drainage of soils under forest management. In response to a question raised by the ERT during the review, Australia acknowledged the error in NIR table 11.2 and committed to rectify it in the next annual submission. The ERT recommends that the Party enhance QA/QC activities and provide the corrected data.

Land converted to forest land – CO_2

61. Following the recommendation made in the previous review report that the Party further investigate the divergence regarding the figures on biomass growth between the FullCAM model and the national statistics on wood harvesting from plantations for the category grassland converted to forest land, the Party implemented updated growth calibrations of mixed species environmental plantings and the inclusion of mallee eucalypt species based on the research by CSIRO. This recalculation led to differences in estimates of removals, in particular for 1990 (decrease of removal figures by 38.7 per cent) which were adequately explained in the NIR. The ERT welcomes the improvements.

Cropland remaining cropland – CO_2

62. The previous ERT concluded that the model applied by Australia for cropland remaining cropland estimates did not produce estimates that are fully comparable with those prepared by applying the IPCC tier 1 methodology (i.e. designed to estimate carbon stock changes associated with changes in management practices). Recommendations made in the previous review report included that Australia enhance its model by including the impact of management practices, and their changes, on the carbon stock changes in soil organic matter. The current ERT requested the Party to provide the estimates of carbon stock changes for the soils pool, by incorporating the impact of management practices. In response to the question raised by the ERT during the current review, Australia indicated that this is already included in its improvement plan and it is currently working to implement the new data on management practices, crop yields and soil carbon stocks into a

tier 3 method, with a view to submitting significantly improved estimates in the 2015 annual submission. The ERT welcomes the ongoing efforts made by the Party to provide estimates that incorporate the effect of management practices and reiterates the recommendation made in the previous review report that the Party provide soil carbon estimates taking into account the changes to management practices.

63. The ERT noted some inconsistencies regarding the estimates for biomass and soil pools between data presented in the NIR and the CRF tables (e.g. in section 7.8.1 of the NIR, it is stated that "the CO_2 emissions and removals from changes in the area of perennial woody crops are estimated using a country-specific tier 2 approach", whereas in CRF table 5B no estimates are reported for the living biomass (reported as "NO") and the dead organic matter (DOM) (reported as "NA") pools). In response to the questions raised by the ERT during the review, the Party indicated that the notation key for living biomass in the CRF table should have been "IE" instead of "NO", as emissions and removals associated with woody biomass are included in carbon stock changes in mineral soils. The ERT recommends that the Party enhance its QA/QC activities to ensure the appropriate use of notation keys and full consistency between the data in the CRF tables and the NIR. The ERT also recommends that the Party separately report perennial woody crops in the CRF tables.

Grassland remaining grassland – CO_2

64. The ERT noted some inconsistencies regarding the estimates for biomass and soil pools, between data presented in the NIR and CRF table 5.C (e.g. in table 7.3 of the NIR net emissions and removals from grassland remaining grassland are reported by subdivision (soil carbon and perennial woody biomass) for the period 1990–2012, whereas in CRF table 5C estimates are reported only for the DOM and soils pools) and requested the Party to provide a clarification. In response to the question raised by the ERT during the review, the Party responded that the notation key for living biomass should have been "IE" instead of "NO", as emissions and removals associated with woody biomass are included in carbon stock changes in the DOM pool. The ERT recommends that Australia enhance its QA/QC activities to ensure the appropriate use of notation keys and full consistency between the data in the CRF tables and the NIR. The ERT also recommends that the Party separately report perennial woody biomass in the CRF tables.

65. Based on the recalculations in the grassland remaining grassland category (for 2011, emissions decreased by 13,113.63 $GgCO_2$ eq, a decrease of 95.5 per cent), the ERT requested the Party to further elaborate on the explanations provided in the NIR on the rationale for the recalculations for the category. In response to the question raised by the ERT during the review, the Party responded that the time series for soil carbon has been recalculated following the implementation of a dynamic crop/pasture growth module in FullCAM, following the recommendation made in the 2012 annual review report. The ERT recommends that the Party further report in the NIR the changes made to FullCAM, as well as on the progress made regarding the relevant, ongoing work referred to in paragraph 62 above.

Land converted to wetlands – CO_2

66. Australia distinguishes in its national land system the conversions from forest land to grassland and from forest land to wetlands. However, conversions from forest land to wetlands are not identified in the Party's GHG inventory, where the emissions are associated with those from the conversion from forest land to grassland. The ERT recommends that the Party identify in the annual submission the conversions from forest land to wetlands, and provide separate AD and emission estimates.

3. Non-key categories

Land converted to settlements – CO_2

67. Similar to the issue presented in the paragraph 66 above, Australia distinguishes in its national land systems the conversions from forest land to grassland and from forest lands to settlements. However, the conversions from forest land to settlements are not identified in the GHG inventory, where the emissions are associated with those from the conversion from forest land to grassland. The ERT recommends that the Party distinguish in the annual submission the conversions from forest land to settlements, and provide separate AD and emission estimates.

Biomass burning – CH_4, N_2O

68. The ERT noted that Australia reports "IE" for AD in CRF table 5(V) for grassland remaining grassland, without an indication of where the AD are reported. In response to a question raised by the ERT during the review, the Party stated that AD for this land-use category have been omitted from this table, but indicates that these data will be included in the next annual submission. ERT recommends that the Party include these data, enhancing the completeness of the reporting.

F. Waste

1. Sector overview

69. In 2012, emissions from the waste sector amounted to 11,723.27 Gg CO_2 eq, or 2.2 per cent of total GHG emissions. Since 1990, emissions have decreased by 31.2 per cent, and are 9.5 per cent lower than 2011 (1,226.57 Gg CO_2 eq). The key drivers for the fall in emissions are the increased rates of recovery of CH_4 from solid waste disposal on land, and changes to wastewater handling in industry. Within the sector, 76.6 per cent of the emissions were from solid waste disposal on land, followed by 22.3 per cent from wastewater handling, 0.8 per cent from other (waste) and 0.3 per cent from waste incineration.

70. Australia has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculation made by Australia between the 2013 and 2014 annual submissions was in the following category: solid waste disposal on land. The recalculation was made following changes in AD, including incorporation of additional NGER facility data for this annual submission. Recalculations were also made in wastewater handling (due to changes in the population connected to sewers) and biological treatment of solid waste, based on the results of a composting industry survey for the 2011 inventory year. Compared with the 2013 annual submission, the recalculations increased emissions in the sector by 158.70 Gg CO_2 eq (1.2 per cent), and increased total national emissions by 0.03 per cent. The recalculations were adequately explained in the NIR.

71. The ERT noted that the descriptors for QA/QC procedures, in particular for key categories, are improved this year following the recommendation made in the previous review report. The ERT welcomes these improvements.

2. Key categories

Solid waste disposal on land – CH_4

72. CH_4 emissions from this category are estimated using the tier 2 first-order decay (FOD) model included in the 2006 IPCC guidelines. The ERT concludes that the use of

the 2006 IPCC Guidelines was appropriately justified as a country-specific approach for Australia. Municipal solid waste streams (waste from household, commercial and industrial waste; and construction and demolition waste) percentages are determined based on territorial and national data. Waste composition data for landfills are determined either from the NGER data collection system (for 2009–2012), or country-specific waste mix percentages. The EFs (the decay rate (k), degradable organic carbon (DOC) and the fraction by volume of CH_4 in landfill gas) are mainly default parameters from the 2006 IPCC model, though with consideration of the differences in climatic zones (parameter k) and country-specific DOCf (fraction of DOC dissimilated) for each waste type. Australia states in its NIR that, according to a survey conducted in 2007,[15] Australian landfills meet IPCC characteristics for well-managed landfills. Based on this, a methane conversion factor (MCF) of 1 and an oxidation factor equal to 0.1 are selected, in line with 2006 IPCC Guidelines. The quantity of CH_4 recovered for flaring and power is appropriately based on CH_4 capture data reported under NGER for 2009 onwards and industry surveys for the years 1990–2008, consistent with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and the IPCC good practice guidance. Emissions from the combustion of landfill gas for power generation are reported in the energy sector.

Wastewater handling – CH_4, N_2O[16]

73. Australia reports CH_4 emission estimates for wastewater and sludge separately, for both industrial and domestic and commercial wastewater, using facility-specific data or averaged nationwide AD (chemical oxygen demand (COD) and MCF) values based on data from NGER (2009–2012). The COD parameter for organic material in wastewater is used in the estimates for both industrial and domestic and commercial wastewater. The MCF parameters are chosen according to wastewater management practices in the country. EFs are also facility-speific or averaged (where facility-level data were unavailable). The ERT commends the Party for its comprehensive description of this category in the NIR and the high level of disaggregation that enhances the accuracy of reporting both CH_4 and N_2O emissions.

74. The estimation of industrial wastewater emissions focuses on the nine major industrial sectors which are considered to generate the most significant quantities of wastewater in Australia. Facility-specific data on the quantities of organic waste are used, where available. Where facility-specific data are not available, AD are based on country-specific wastewater and COD generation rates. The ERT commends Australia in its comprehensiveness of reporting for this category.

75. The ERT noted that a value for wastewater output from beer production is reported as confidential ("C") in the 2014 annual submission, while in its 2013 annual submission, Australia reported this value for 1990–2011 (e.g. 11,791.92 m^3 for 2011). In response to a question raised by the ERT during the review, the Party indicated that there are only a small number of beer companies reporting under NGER and that emissions and AD (at the company level) are confidential. The Party further noted that aggregated emissions from industrial wastewater are still reported in order to protect confidentiality. The ERT accepts the Party's explanation.

76. N_2O emissions from industrial wastewater are reported as "IE", as approximately 87 per cent of sludge from wastewater treatment plants is applied to land as fertilizer and 13

[15] Waste Management Association of Australia. 2007. *National Landfill Survey Results*.

[16] N_2O emissions from this category are not key. However, since all emissions related to this category are discussed as a whole, the individual gases are not assessed separately.

per cent is landfilled. The N_2O emissions from domestic and commercial wastewater are reported as "NA" as most of the output wastewater from wastewater treatment plants is discharged into the deep ocean. N_2O emissions are estimated for human sewage only based on the Revised 1996 IPCC Guidelines and using EFs differentiated according to the source of N_2O generation. The ERT commends the Party for its transparency in the description of this subcategory.

3. Non-key categories

Waste incineration – CO_2, CH_4, N_2O

77. Australia has reported estimates of CO_2 emissions from the incineration of solvents and clinical waste (full time series), as well as of CO_2 and N_2O emissions from the incineration of municipal solid waste (MSW), for the period 1990–1996 (incineration ceased in 1996 according to the NIR). The ERT notes that previous review reports have encouraged Australia to study further the occurrence of CH_4 and N_2O emissions from the incineration of solvents and clinical wastes, as these emissions may occur. In response to questions raised by the ERT in a previous review, Australia had stated that it intended to conduct a review to determine N_2O EFs for clinical waste and solvents. The current ERT notes that no additional information has been provided in the 2014 annual submission. Therefore, the ERT reiterates the encouragement made in previous review reports that the Party provide an update on any further studies on this matter, and if appropriate, provide estimates for these gases in its annual submission. If no new information is reported for clinical waste or solvents, the ERT recommends that Australia replace the notation key "NA" with "NE". The also ERT recommends that, for CO_2, CH_4 and N_2O emissions from MSW incineration, the Party replace the notation key "NA" with "NO" for the years since 1996. The ERT further recommends that this information is clearly documented in its NIR.

G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

78. Table 6 provides an overview of the information reported and parameters selected by Australia under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 6
Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Issue	*Expert review team assessment, if applicable*	*Findings and recommendations*
Assessment of the Party's reporting in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1	Sufficient	
Activities elected under Article 3, paragraph 4, of the Kyoto Protocol	None	
Period of accounting		Annual accounting

Issue	*Expert review team assessment, if applicable*	*Findings and recommendations*
Party's ability to identify areas of land and areas of land-use change in accordance with paragraph 20 of the annex to decision 16/CMP.1	Sufficient	

79. Chapter G.1 includes the ERT's assessment of the 2014 annual submission against the Article 8 review guidelines and decisions 15/CMP.1 and 16/CMP.1. In accordance with decision 6/CMP.9, Parties will begin reporting of KP-LULUCF activities in the submissions due by 15 April 2015 using revised CRF tables, as contained in the annex to decision 6/CMP.9. Owing to this change in the CRF tables for KP-LULUCF activities, and the change from the first commitment period to the second commitment period, paragraphs 80–84 below contain the ERT's assessment of the Party's adherence to the current reporting guidelines and do not provide specific recommendations for reporting these activities in the 2015 annual submission.

Activities under Article 3, paragraph 3, of the Kyoto Protocol

80. The ERT noted during the review that Australia reported zero in table NIR-2 ('other land' categories) as the resulting total area at the beginning and at the end of the inventory year, which is therefore not comparable with the total national area deduced by the CRF tables. In response to the question raised by the ERT during the review, the Party acknowledged that the 'other land' was reported as zero by mistake and committed to correct the error in the next annual submission. The ERT recommends that the Party enhance its QA/QC measures for a fully consistent representation of land and provide the corrected figures.

Afforestation and reforestation – CO_2

81. No major issues were identified and the ERT agrees with the estimation and reporting of net emissions and removals from this activity provided in the annual submission.

Deforestation – CO_2

82. As noted in previous review reports, Australia does not report under deforestation those lands that converted naturally to forest land after 1990 from which the forest vegetation has been cleared. The recommendation in the previous review report was that Australia enhance the consistency of its reporting and accounting in line with the provisions of decision 16/CMP.1 by reporting under deforestation each and any cleared forest land since 1990, regardless of its land use on 31 December 1989. During the review of the 2014 annual submission, the ERT asked the Party to highlight the progress made in the last year in view of this recommendation. The Party highlighted its ongoing work and references in the NIR regarding the categories of land that are included under deforestation, and those that currently are not. The ERT acknowledges the Party's explanation regarding the reconciliation between its reporting of conversion from forest land to other land uses under the Convention and of deforestation under the Kyoto Protocol. The ERT agrees with the recommendations outlined in both the 2012 and 2013 annual review reports, including the conclusion that the Party's reporting of these lands is not fully consistent with decision 16/CMP.1, but also acknowledges the conclusions in paragraphs 100 and 101 of the previous review report[17] and agrees that in the current annual submission adjustments would not apply in this situation.

[17] FCCC/ARR/2013/AUS, paragraphs 100 and 101.

83. The ERT recommends that the Party closely consider its current national circumstances in the context of the new UNFCCC Annex I inventory reporting guidelines to ensure that all of the required land areas, emissions and removals are accurately accounted for in the annual submission, including emission estimates from deforestation on each and any cleared forest land since 1990, regardless of its land use on 31 December 1989.

84. During the review, the ERT requested that the Party clarify the methodology used and assumptions made to assess the CO_2 emissions from lime and dolomite application, focusing on the area subject to liming. In response to the questions raised by the ERT during the review, the Party provided the methodological assumptions and data used to estimate emissions from lime application on units of land subject to afforestation/reforestation and deforestation. The ERT concluded that the estimation process results in accurate estimates and recommends that the Party include this information in the NIR submission.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

85. Australia has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings included in the standard independent assessment report (SIAR) on the SEF tables and the SEF comparison report.[18] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings contained in the SIAR.

86. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements referred to in decision 22/CMP.1, annex, paragraph 88(a–j). The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

Accounting of activities under Article 3, paragraph 3, of the Kyoto Protocol

87. Australia has reported information on its accounting of KP-LULUCF in the accounting table, as included in the annex to decision 6/CMP.3. Information on the accounting of KP-LULUCF has been prepared and reported in accordance with decisions 16/CMP.1 and 6/CMP.3.

88. Table 7 shows the accounting quantities for KP-LULUCF as reported by the Party and the final values after the review.

[18] The SEF comparison report is prepared by the international transaction log (ITL) administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

Table 7

Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol, in t CO_2 eq

			2014 annual submission[a]	*2010, 2011, 2012 and 2013 annual submissions*[b]	*Net accounting quantity*[c]
	As reported	*Revised estimates*	*Final*	*Final*	
Afforestation and reforestation					
Non-harvested land	–102 612 006		–102 612 006	–95 999 190	–6 612 816
Harvested land	–6 329 871		–6 329 871	–37 852	–6 292 019
Deforestation	224 567 441		224 567 441	188 247 236	36 320 205
Forest management	NA		NA	NA	NA
Article 3.3 offset[d]	NA		NA	NA	NA
Forest management cap[e]	NA		NA	NA	NA
Cropland management	NA		NA	NA	NA
Grazing land management	NA		NA	NA	NA
Revegetation	NA		NA	NA	NA

Abbreviation: NA = not applicable

[a] The values included under the 2014 annual submission are the cumulative accounting values for 2008, 2009, 2010, 2011 and 2012, as reported in the accounting table of the KP-LULUCF CRF tables for the inventory year 2012.

[b] The values included under the 2010, 2011, 2012 and 2013 submissions are the final accounting values as a result of the 2013 review and are included in table 7 of the 2013 annual review report (FCCC/ARR/2013/AUS, page 34) in the column "2013 annual submission", "Final". This column is applicable only for Parties that elected annual accounting.

[c] The "net accounting quantity" is the quantity of Kyoto Protocol units that the Party shall issue or cancel under each activity under Article 3, paragraph 3, and paragraph 4, if relevant, based on the final accounting quantity in the 2014 annual submission and where the quantities issued or cancelled based on the 2013 annual review report have been subtracted ("net accounting quantity" = final 2014 – final 2013 annual review report).

[d] "Article 3.3 offset": for the first commitment period, a Party included in Annex I to the Convention that incurs a net source of emissions under the provisions of Article 3, paragraph 3, of the Kyoto Protocol may account for anthropogenic greenhouse gas emissions by sources and removals by sinks in areas under forest management under Article 3, paragraph 4, up to a level that is equal to the net source of emissions under the provisions of Article 3, paragraph 3, but not greater than 9.0 megatonnes of carbon times five, if the total anthropogenic greenhouse gas emissions by sources and removals by sinks in the managed forest since 1990 is equal to, or larger than, the net source of emissions incurred under Article 3, paragraph 3.

[e] In accordance with decision 16/CMP.1, annex, paragraph 11, for the first commitment period only, additions to and subtractions from the assigned amount of a Party resulting from forest management under Article 3, paragraph 4, of the Kyoto Protocol after the application of decision 16/CMP.1, annex, paragraph 10, and resulting from forest management project activities undertaken under Article 6, shall not exceed the value inscribed in the appendix of the annex to decision 16/CMP.1, times five.

89. Based on the information provided in table 7 for the activity afforestation and reforestation, Australia shall: for non-harvested land, issue 6,612,816 removal units (RMUs) in its national registry; and for harvested land, issue 6,292,019 RMUs in its national registry.

90. Based on the information provided in table 7 for the activity deforestation, Australia shall cancel 36,320,205 assigned amount units, emission reduction units, certified emission reduction units and/or RMUs in its national registry.

Calculation of the commitment period reserve

91. Australia has reported its commitment period reserve in its 2014 annual submission. Australia reported that its commitment period reserve has not changed since the initial report review (2,661,821,229 t CO_2 eq) as it is based on the assigned amount and not the most recently reviewed inventory.

3. Changes to the national system

92. Australia reported that there are changes in its national system since the previous annual submission. Mainly, the changes concern the arrangements for approving the inventory, the process for inventory compilation and the QA/QC activities. In addition, the name of the single national entity has changed from the Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education (DIICCSRTE) to DE; the climate change sections of the DIICCSRTE were incorporated in their entirety into DE and their responsibilities for the compilation of the national inventory remain unchanged. The Party described these changes in its NIR. The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

4. Changes to the national registry

93. Australia reported that there are changes in its national registry since the previous annual submission. The changes refer to the release of a new version of, and enhancement to, the registry web application, changes to the publicly available information as well as a new internet address. The Party described the changes in its NIR. The ERT concluded that, taking into account the confirmed changes in the national registry, Australia's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol.

5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

94. Consistent with paragraph 23 of the annex to decision 15/CMP.1, Australia provided information relating to how it is striving, under Article 3, paragraph 14, of the Kyoto Protocol, to implement its commitments in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention.

95. Australia reported that there are changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol since the previous annual submission. Australia has updated information on the actions and activities relating to the implementation of its commitments under Article 3, paragraph 14, specifically actions to reduce its emissions by five per cent on 2000 levels by 2020. Australia's Emissions Reduction Fund will provide incentives for the lowest cost emissions reduction activities and international initiatives to advance practical climate action are supported consistent with continued economic growth.

96. Australia cooperates with the Asia-Pacific region and other developing countries to build economic resilience and is also participating in efforts to develop and deploy low-emission technologies, including in developing countries. This includes efforts through technology partnerships such as the International Partnership for Geothermal Technology, the Carbon Sequestration Leadership Forum, the Global Methane Initiative and the Australia–China Joint Coordination Group on Clean Coal Technology, as well as through

participation in the broad-ranging work programme of the International Renewable Energy Agency which promotes the widespread adoption and sustainable use of all forms of renewable energy.

97. The Party described the changes in its NIR. The ERT concluded that, taking into account the confirmed changes in the reporting, the information provided is complete and transparent.

III. Conclusions and recommendations

A. Conclusions

98. Table 8 summarizes the ERT's conclusions on the 2014 annual submission of Australia, in accordance with the Article 8 review guidelines.

Table 8
Expert review team's conclusions on the 2014 annual submission of Australia

Issue	*Expert review team assessment*	*Paragraph cross-references for identified problems*
The ERT concludes that the inventory submission of Australia is complete with regard to categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1990–2012		
Annex A sources[a]	Complete	
LULUCF[b]	Complete	
KP-LULUCF	Complete	
The ERT concludes that the inventory submission of Australia has been prepared and reported in accordance with the UNFCCC reporting guidelines	Yes	
The Party's inventory is in accordance with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF	Generally	39, 66
The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1	Yes	
Australia has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1	Yes	
The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1	Yes	
The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions	Yes	

Issue	*Expert review team assessment*	*Paragraph cross-references for identified problems*
Did the Party provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol?	Yes	

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories"

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Revised 1996 IPCC Guidelines, the IPCC good practice guidance or the IPCC good practice guidance for LULUCF).

B. Recommendations

99. The ERT identified the issues for improvement listed in table 9. All recommendations are for the next annual submission, unless otherwise specified.

Table 9
Recommendations identified by the expert review team

Sector	*Category, cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross-references*
Cross-cutting	QA/QC	Transparently describe the categories that have undergone additional tier 2 QC checks (e.g. verification of the IEF)	No	Table 3
Energy	Overview	Include more detailed information about fuel reallocation and emission changes resulting from recalculations in the NIR	No	18
	Comparison of the reference approach with the sectoral approach and international statistics	Prepare and revise the reference approach tables for the years prior to 2012 and present them in the NIR with explanations	Yes	20
		Provide details of any relevant update on the collaboration with BREE to clarify coal production data reported to the secretariat and IEA, as well as including a rationale for any differences observed between the CRF tables and the data reported to the IEA	No	21

Sector	Category, cross-cutting issue	Recommendation	Reiteration of previous recommendation?	Paragraph cross-references
	International bunker fuels	Continue to investigate the underlying inconsistencies regarding domestic and international splits for aviation fuel consumption and include a more detailed explanation in the NIR	No	22
		Reflect any progress made in the NIR to understand the discrepancies in the data for residual fuel oil consumption in international marine bunkers	No	23
	Stationary combustion: liquid and solid fuels – CO_2, CH_4 and N_2O	Include AD data information from the seven national petroleum refining operations	No	25
		More clearly present where emissions from refinery coke have been reported	No	26
		Include information on the uses of black coal for combustion purposes in the NIR	No	27
		Describe the rationale for the inter-annual changes observed for CO_2 emissions from combustion of liquid fuels in other stationary combustion (i.e. lubricants)	No	28
	Road transport: liquid fuels – CH_4	Provide the rationale for reduction in the CH_4 IEF for gasoline	No	29
	Oil and natural gas: liquid and gaseous fuels – CO_2 and CH_4	Describe the observed trends, including supporting data, for CH_4 emissions from natural gas production and processing and CH_4 and CO_2 emissions from distribution	No	31
		Identify appropriate methods to ensure a consistent time series for this category, and present this information	No	32
		Update the AD for petroleum refined in the CRF tables	No	33
Industrial processes and solvent and other product use	Consumption of halocarbons and SF_6 – HFCs	Continue to increase the transparency for this category by providing a clear description of AD, EFs and the methodology used for estimating emissions	Yes	38
	Electrical equipment – SF_6	Report operation and disposal emissions separately	Yes	39

Sector	*Category cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross-references*
Agriculture	Overview	Include a pre-weaning class for cattle	Yes	42
	Manure management – CH_4, N_2O	Implement the upgraded PigBal model into the Australian inventory as soon as it has undergone appropriate QA/QC controls	No	44
	Direct soil emissions – N_2O	Describe the assumptions used to allocate synthetic fertilizers to forest land	Yes	45
	Prescribed burning of savannas – CH_4 and N_2O	Use the appropriate notation keys under the additional information in the relevant CRF table	Yes	48
	Rice cultivation – CH_4	Enhance transparency of the discussion on uncertainty and time series consistency for this category	No	50
LULUCF	Overview	Include in the NIR information regarding the estimation model for forest land remaining forest land, specifically regarding the change concerning shedding and resprouting	No	52
		Further monitor the performance of the revised model and provide updates in the NIR	No	52
		Provide detailed explanations on any future recalculations in the NIR	No	52
		Include additional information provided during the review regarding the combination and harmonization of different data sources/databases to represent land-use categories and conversions, as well as the time frames used for these conversions and the associated changes to soil carbon stocks	No	53
		Include, in the LULUCF chapter of the NIR, synthesized information related to land representation, including the methodology applied for the assessment of land use and land-use change, background data and transition periods applied, in line with the information provided during this review	No	54
		Include, in the NIR, a confusion matrix for both land converted to grassland and land converted to cropland	Yes	54
		Enhance QA/QC measures and ensure full correspondence between data reported in the NIR and the CRF tables regarding distribution on total land area per land-use categories/subcategories	No	55

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross-references*
	Forest land remaining forest land – CO_2	Present in the NIR more comprehensive information regarding wood harvesting, in line with the explanations provided during the review	No	56
		Include in the NIR additional information regarding the mapping of plantations established recorded from 1940–1989, and the associated estimates	No	57
		Present in the NIR the methodology used to estimate emissions from fuelwood extractions from dead organic matter pools	No	58
		Provide in the NIR additional information regarding the mandate of the NFI, detailing the alternative means used to obtain and derive data on emissions and removals from the biomass and non-biomass pools in the forest land remaining forest land subcategory	No	59
		Correct the error in NIR table 11.2 and enhance QA/QC activities	No	60
	Cropland remaining cropland – CO_2	Provide soil carbon estimates taking into account changes to management practices	Yes	62
		Enhance QA/QC activities to ensure the appropriate use of notation keys and full consistency between the data in the CRF tables and the NIR	No	63
		Separately report perennial woody crops in the CRF tables	No	63
	Grassland remaining grassland – CO_2	Enhance QA/QC activities to ensure the appropriate use of notation keys and full consistency between the data in the CRF tables and the NIR	No	64
		Separately report perennial woody crops in the CRF tables	No	64
		Further report in the NIR the changes made to FullCAM, as well as on the progress made regarding relevant, ongoing work	No	65
	Land converted to wetlands – CO_2	Identify in the annual submission the conversions from forest land to wetlands, and provide separate AD and emission estimates	No	66

Sector	*Category, cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross-references*
	Land converted to settlements – CO_2	Distinguish in the annual submission the conversions from forest land to settlements, and provide separate AD and emission estimates	No	67
	Biomass burning – CH_4, N_2O	Include AD from biomass burning for grassland remaining grassland	No	68
Waste	Waste incineration – CO_2, CH_4, N_2O	If no other data are available, replace the notation key "NA" with "NE" for N_2O emissions from clinical waste and solvents	No	77
		Replace the notation key "NA" with "NO" for the years since 1996 for CO_2, CH_4 and N_2O emissions from MSW incineration and clearly document this information in the NIR	No	77
KP LULUCF	Overview	Enhance QA/QC measures for a fully consistent representation of land and provide the corrected figures	No	80
	Deforestation	Closely consider current national circumstances in the context of the new UNFCCC Annex I inventory reporting guidelines to ensure that all of the required land areas, emissions and removals are accurately accounted for in the annual submission, including emission estimates from deforestation on each and any cleared forest land since 1990, regardless of its land use on 31 December 1989	No	83
		Include information in the NIR to clarify the methodology used and assumptions made to assess the CO_2 emissions from lime and dolomite application, focusing on the area subject to liming	No	84

Abbreviations: AD = activity data, BREE = Bureau of Resources and Energy Economics, CRF = common reporting format, EFs = emission factors, IEA = International Energy Agency, IEF = implied emission factor, KP LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, MSW = municipal solid waste, NA = not applicable, NE = not estimated, NFI = national forest inventory, NIR = national inventory report, NO = not occurring, QA/QC = quality assurance/quality control, UNFCCC Annex I inventory reporting guidelines = "Guidelines for the preparation of national communications by Parties include in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories".

IV. Questions of implementation

100. No questions of implementation were identified by the ERT during the review.

Annex I

Information to be included in the compilation and accounting database

Table 10

Information to be included in the compilation and accounting database in t CO_2 eq for 2012, including the commitment period reserve

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Commitment period reserve	**2 661 821 229**			**2 661 821 229**
Annex A emissions for 2012				
CO_2	397 830 605			397 830 605
CH_4	111 709 499			111 709 499
N_2O	25 775 430			25 775 430
HFCs	7 945 106			7 945 106
PFCs	253 697			253 697
SF_6	134 111			134 111
Total Annex A sources[c]	**543 648 448**			**543 648 448**
Activities under Article 3, paragraph 3, for 2012				
3.3 Afforestation and reforestation on non-harvested land for 2012	–22 145 251			–22 145 251
3.3 Afforestation and reforestation on harvested land for 2012	10 638 518			10 638 518
3.3 Deforestation for 2012	32 805 462			32 805 462
Activities under Article 3, paragraph 4, for 2012[d]				
3.4 Forest management for 2012				
3.4 Cropland management for 2012				
3.4 Cropland management for 2012				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2012				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2012				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

[a] "Adjustment" is relevant only for Parties for which the expert review team (ERT) has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 11
Information to be included in the compilation and accounting database in t CO_2 eq for 2011

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2011				
CO_2	398 161 387			398 161 387
CH_4	110 272 742			110 274 742
N_2O	25 201 094			25 201 094
HFCs	7 512 150			7 512 150
PFCs	259 251			259 251
SF_6	134 137			134 137
Total Annex A sources	**541 542 760**			**541 542 760**
Activities under Article 3, paragraph 3, for 2011				
3.3 Afforestation and reforestation on non-harvested land for 2011	−25 328 058			−25 328 058
3.3 Afforestation and reforestation on harvested land for 2011	5 953 366			5 953 366
3.3 Deforestation for 2011	38 525 028			38 525 028
Activities under Article 3, paragraph 4, for 2011[c]				
3.4 Forest management for 2011				
3.4 Cropland management for 2011				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2011				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2011				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

[a] "Adjustment" is relevant only for Parties for which the expert review team (ERT) has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 12
Information to be included in the compilation and accounting database in t CO_2 eq for 2010

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2010				
CO_2	399 364 819			399 364 819
CH_4	109 062 639			109 062 639
N_2O	24 451 857			24 451 857
HFCs	6 942 607			6 942 607
PFCs	243 764			243 764
SF_6	145 186			145 186
Total Annex A sources[c]	**540 210 872**			**540 210 872**
Activities under Article 3, paragraph 3, for 2010				
3.3 Afforestation and reforestation on non-harvested land for 2010	–21 534 022			–21 534 022
3.3 Afforestation and reforestation on harvested land for 2010	4 901 815			4 901 815
3.3 Deforestation for 2010	47 705 972			47 705 972
Activities under Article 3, paragraph 4, for 2010[d]				
3.4 Forest management for 2010				
3.4 Cropland management for 2010				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2010				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2010				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

[a] "Adjustment" is relevant only for Parties for which the expert review team (ERT) has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 13
Information to be included in the compilation and accounting database in t CO_2 eq for 2009

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2009				
CO_2	398 668 771			398 668 771
CH_4	110 806 532			110 806 532
N_2O	24 897 903			24 897 903
HFCs	6 353 310			6 353 310
PFCs	307 887			307 887
SF_6	143 231			143 231
Total Annex A sources[c]	**541 177 634**			**541 177 634**
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009	−17 422 266			−17 422 266
3.3 Afforestation and reforestation on harvested land for 2009	2 185 850			2 185 850
3.3 Deforestation for 2009	48 784 081			48 784 081
Activities under Article 3, paragraph 4, for 2009[d]				
3.4 Forest management for 2009				
3.4 Cropland management for 2009				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2009				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2009				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol

[a] "Adjustment" is relevant only for Parties for which the expert review team (ERT) has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 14
Information to be included in the compilation and accounting database in t CO_2 eq for 2008

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2008				
CO_2	399 084 151			399 084 151
CH_4	113 592 760			113 592 760
N_2O	25 546 777			25 546 777
HFCs	5 810 538			5 810 538
PFCs	381 136			381 136
SF_6	158 400			158 400
Total Annex A sources[c]	**544 573 762**			**544 573 762**
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	–16 182 409			–16 182 409
3.3 Afforestation and reforestation on harvested land for 2008	–598 184			–598 184
3.3 Deforestation for 2008	56 746 897			56 746 897
Activities under Article 3, paragraph 4, for 2008[d]				
3.4 Forest management for 2008				
3.4 Cropland management for 2008				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2008				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2008				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

[a] "Adjustment" is relevant only for Parties for which the expert review team (ERT) has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Annex II

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories". FCCC/SBSTA/2006/9. Available at <http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>.

"Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention". FCCC/CP/2002/8. Available at <http://unfccc.int/resource/docs/cop8/08.pdf>.

"Guidelines for national systems for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks under Article 5, paragraph 1, of the Kyoto Protocol". Decision 19/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Decision 15/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>.

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Synthesis and assessment report on the greenhouse gas inventories submitted in 2014. Available at <http://unfccc.int/resource/webdocs/sai/2014.pdf>.

FCCC/ARR/2013/AUS. Report of the individual review of the annual submission of Australia submitted in 2013. Available at <http://unfccc.int/resource/docs/2014/arr/aus.pdf>.

Standard independent assessment report template, parts 1 and 2. Available at <http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Rob Sturgiss and Ms. Tamara Curll (Department of the Environment), including additional material on the methodology and assumptions used.

Annex III

Acronyms and abbreviations

AD	activity data
C	carbon
CH_4	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
COD	chemical oxygen demand
CRF	common reporting format
DOC	degradable organic carbon
DOCf	fraction of DOC dissimilated
DOM	dead organic matter
EF	emission factor
ERT	expert review team
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
ha	hectare
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
k	decay rate
kg	kilogram (1 kg = 1,000 grams)
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
LTO	landing and take-off
LULUCF	land use, land-use change and forestry
m^3	cubic metre
MCF	methane conversion factor
MSW	municipal solid waste
N	nitrogen
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NFI	National forest inventory
NGER	National Greenhouse and Energy Reporting Scheme
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10^{15} joule)
QA	quality assurance
QA/QC	quality assurance/quality control
RMU	removal unit
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report

TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change